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World Intellectual Property Organization
PCT Division
34 Chemin des Colombettes
1211 Geneva 20
Switzerland

Amendment of the claims under Article 19(1) (Rule 46)

Re: International Application No. PCT/JP03/08563
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Dear Sirs,

The Applicant, who received the International Search Report relating to the above-identified International application transmitted on October 21, 2003, hereby files amendment under Article 19(1) as in the attached sheets.

Further, the Applicant hereby attaches new Sheet No. 39, 40, 43/1 and 43/2 because the intended amendment results in the addition and amendment to the claims therein. Thus claims 1-14, 16-20, 22 and 24-35 are retained unchanged, claims 15, 21 and 23 are amended and claims 36-42 are added.

The applicant also files as attached herewith a brief statement explaining the amendment and indicating any impact that amendment therein might have on the description and drawings.

Very truly yours,

Yusuke Hiraki

Yusuke HIRAKI
YH/ki/yy
Encl. (1) Amendment under Article 19(1) 1 sheet
(2) Brief Statement 1 sheet

14. A fluorescent tube lighting apparatus having the pair of inverter circuits of any of claims 1 to 13 and a fluorescent tube as a driven unit connected to the inverter circuits.

15. (Amended) The fluorescent tube lighting apparatus of claim 14, configured using a plurality of the fluorescent tube lighting apparatuses, wherein all fluorescent tubes in the fluorescent tube lighting apparatus are disposed so as to be arranged in parallel, characterized by having a means for indirect connection that indirectly connects each fluorescent tube lighting apparatus so that the phases of voltages applied to each fluorescent tube are inverted sequentially per each fluorescent tube or per the number of fluorescent tubes of each fluorescent tube lighting apparatus.

16. The fluorescent tube lighting apparatus of claim 15, characterized in that the means for indirect connection of the fluorescent tube lighting apparatuses uses inductive coupling between windings provided in each fluorescent tube lighting apparatus.

17. The fluorescent tube lighting apparatus of claim 16, characterized in that the inductive coupling between windings according to the means for indirect connection of fluorescent tube lighting apparatuses comprises coupling between tertiary windings not used in self-excited oscillation of each of the inverter circuits, or coupling between choke coils of each inverter circuit, or coupling between secondary windings not used in a power supply of a driven unit of each inverter circuit, or coupling between windings connected in parallel to tertiary windings used in self-excited oscillation.

18. The fluorescent tube lighting apparatus of claim 17, characterized in that, in the means for indirect connection of fluorescent tube lighting apparatuses, the coupling between tertiary windings not used in self-excited oscillation or the coupling between secondary windings not used in a power supply of a driven unit comprises direct coupling, coupling via transformer, or proximity coupling of parallel coils.

19. The fluorescent tube lighting apparatus of claim 17, characterized in that, in the means for indirect connection of fluorescent tube lighting apparatuses, the coupling between choke coils or the coupling between windings connected in parallel to tertiary windings used in self-excited oscillation comprises coupling via transformer, proximity coupling of parallel coils, transformed coupling, or simple proximity coupling.

20. A backlight apparatus, characterized by having the fluorescent tube lighting apparatus of any of claims 14 to 19.

21. (Amended) A backlight apparatus, characterized by having the fluorescent tube lighting apparatus of any of claims 14 to 19, a reflector plate disposed facing a fluorescent tube comprised by the fluorescent tube lighting apparatus that reflects light emitted by the fluorescent tube to the fluorescent tube side, a light diffuser disposed facing the side of the fluorescent tube opposite the side on which the reflector plate is

disposed to thereby sandwich the fluorescent tube.

22. A backlight apparatus according to the backlight apparatus of claim 20 or 21, characterized in that fluorescent tubes are all disposed in parallel and in a horizontal direction.

23. (Amended) A liquid crystal display characterized by having the backlight apparatus of any of claims 20 to 22, and a liquid crystal panel disposed facing a surface of the backlight apparatus that emits light, wherein the liquid crystal panel gradually changes the transmittance of light to display a specified image.

36. (Added) A pair of inverter circuits disposed on both ends of a driven unit, characterized by having means for connecting each inverter circuit such that alternating voltages applied to both ends of the driven unit maintain a reverse phase relationship with respect to each other.

37. (Added) A fluorescent tube lighting apparatus characterized by having the inverter circuit of claim 36 and a fluorescent tube as a driven unit connected to the inverter circuit.

38. (Added) The fluorescent tube lighting apparatus of claim 37, configured using a plurality of the fluorescent tube lighting apparatuses, wherein all fluorescent tubes in the fluorescent tube lighting apparatus are disposed so as to be arranged in parallel, characterized by having a means for indirect connection that indirectly connects each fluorescent tube lighting apparatus so that the phases of voltages applied to each fluorescent tube are inverted sequentially per each fluorescent tube or per the number of fluorescent tubes of each fluorescent tube lighting apparatus.

39. (Added) A backlight apparatus, characterized by having the fluorescent tube lighting apparatus of claim 37 or 38.

40 (Added) A backlight apparatus, characterized by having the fluorescent tube lighting apparatus of claim 37 or 38, a reflector plate disposed facing a fluorescent tube comprised by the fluorescent tube lighting apparatus that reflects light emitted by the fluorescent tube to the fluorescent tube side, and a light diffuser disposed facing the side of the fluorescent tube opposite the side on which the reflector plate is disposed to thereby sandwich the fluorescent tube.

41 (Added) A backlight apparatus according to the backlight apparatus of claim 39 or 40, characterized in that fluorescent tubes are all disposed in parallel and in a horizontal direction.

42 (Added) A liquid crystal display characterized by having the backlight apparatus of any of claims 39 to 41, and a liquid crystal panel disposed facing a surface of the backlight apparatus that emits light, wherein the liquid crystal panel gradually changes

the transmittance of light to display a specified image.

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Description on the basis of Section 19(i)

Claim 15 clarifies that the scope of the claim is dependent on claim 14.

Claim 21 clarifies that the backlight apparatus need not comprise a liquid crystal panel in particular.

Claim 23 clarifies that the liquid crystal display can be applied not only with a side-edge backlight but also with a direct backlight.

Claim 36 clarifies that the present invention is characterized by having, in the pair of inverter circuits connected to both ends of a driven unit, means such that the phases of alternating voltages applied to both ends of the driven unit are reverse with respect to each other.

The description of the present application describes that "in order to achieve the above objects, the fluorescent tube lighting apparatus of the present invention is characterized by...having a means whereby the inverter circuits are indirectly connected with each other so that alternating voltages applied at both ends of the driven unit maintain a reverse phase relationship with respect to each other" (page 6, line 6 of the description). In other words, the description of the present application describes that the inverter circuits are connected with each other such that alternating voltages applied to both ends of the driven unit are reverse with respect to each other.

Through the inverter circuits according to the present invention, an effect is provided whereby "it is possible to stabilize voltages applied at both ends of a driven unit to reverse the phases of the voltages with respect to each other...[t]hus it is possible to equalize the output at both ends of a driven unit."

Claim 37 clarifies that the present invention employs a fluorescent tube as a driven unit and is characterized by this and the inverter circuits according to claim 36.

The description of the present application describes that "herein, for a driven unit, for example...a fluorescent tube or the like can be used...[f]urther, when the above inverter circuits are used with a fluorescent tube, uniform brightness can be obtained at both ends of the fluorescent tube, and thus the inverter circuits are superior for use in conditions that require a uniform level of brightness" (page 5, line 27 of the description). The use for a fluorescent tube is thus described.

According to the present invention, an effect is provided whereby "the fluorescent tube driving apparatus of the present invention can stabilize voltages applied at both ends of a fluorescent tube to reverse the phases of the voltages with respect to each other...[t]herefore, it is possible to provide a fluorescent tube driving apparatus capable of uniformly driving the brightness at both ends of a fluorescent tube" (page 44, line 11 of the description).

Claim 38 clarifies that the fluorescent tube driving apparatus is characterized in that each fluorescent tube lighting apparatus has a second configuration such that the phases of fluorescent tubes are inverted sequentially per each fluorescent tube or per the number of fluorescent tubes that each fluorescent tube lighting apparatus has, in addition to the components of claim 37.

The description of the present application describes that "next, a fluorescent tube lighting apparatus according to the fifth embodiment of the present invention...[t]he fluorescent tube lighting apparatus according to the present embodiment is characterized by having a first configuration using a means for indirect connection of inverter circuits at both ends of a fluorescent tube and a second configuration using a means for indirect connection of fluorescent tube lighting apparatuses" (page 28, from line 2 of the description). The "second configuration" is described as a component in claim 38, in addition to the "first configuration" described in claim 37.

The fluorescent tube lighting apparatus according to the present invention has an effect such that it "can stabilize voltages applied at both ends of a fluorescent tube to reverse the phases of the voltages with respect to each other...[t]herefore, it is possible to provide a fluorescent tube driving apparatus capable of uniformly driving the brightness at both ends of a fluorescent tube" (page 44, line 11 of the description) from the first configuration. At the same time, it has an effect such that "since unwanted radiant components originating from the fluorescent tubes can be balanced out between the fluorescent tubes, it is possible to reduce noise traveling from a fluorescent light to, for example, a liquid crystal panel" (page 31, line 10 of the description) from the second configuration. Therefore, it is a more effective means for a long fluorescent tube for which the application of higher alternating voltage is required, since noise from the fluorescent tube to a liquid crystal panel is not generated even if the length is unlimited.

Claim 39 clarifies that the backlight apparatus has the fluorescent tube lighting apparatus according to claim 37 or claim 38 as one of its components.

Claim 40 clarifies that the fluorescent tube lighting apparatus according to claim 37 or claim 38 constitutes the backlight apparatus, in combination with various types of optical members, for example.

Claim 41 clarifies that the backlight apparatus according to claim 39 or claim 40 has fluorescent tubes entirely disposed in parallel and in a horizontal direction.

Claim 42 clarifies that the liquid crystal display can be applied not only with a side-edge backlight but also with a direct backlight.